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ABSTRACT

The Delphi method was utilized to identify 36 "most successful" vocational education programs on 12 California community college campuses, and these were contrasted with 36 programs not so identified. Data were collected from the administrative supervisors of both types of programs in order to isolate program characteristics which differentiated the identified "most successful" programs. Twenty easily identified characteristics were found to correlate with successful programs; these spanned the domains of student characteristics, curriculum, faculty, supervision, and the program advisory committee. Successful programs were identified as being large, visible on campus, enrolling females in greater proportion to males, regulated through state licensing, screening applicants, and not offering remedial courses. Seven of these twenty variables were identified as contributing more than half of the explained variance, and appeared representative of a broad spectrum of easily identifiable activity associated with program success. The salience of these seven variables and the representiveness of the total twenty suggested a variety of approaches to the study of program success. (Author/LH)

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Characteristics of Successful Community College Vocational Education Programs

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Abstract

Thirty-six "most successful" vocational education programs on twelve community college campuses are identified by the Delphi method and contrasted with thirty-six programs not so identified. Data collected from the administrative supervisors of both types of programs were analyzed in order to isolate program characteristics which differentiate the identified successful from the not-so-identified program. Twenty easily identified characteristics are found to correlate with programs deemed most successful. Regression analysis indicates that seven characteristics account for more than half of the variance associated with success. Of interest is the wide range of program characteristics associated with success. These span the domains of student characteristics, curriculum, faculty, supervision, and the program advisory committee.

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CHARACTERISTICS OF SUCCESSFUL COMMUNITY COLLEGE VOCATIONAL EDUCATION PROGRAMS

Often it is difficult to judge educational programs or other programs in terms of relative success. This may be due to the unwillingness or inability of knowledgeable administrators to express unbiased and independent judgments for one reason or another, the absence of an adequate standard against which to measure success, or a lack of reliable information. With this kind of administrative problem in mind, the Northern California Research Group[1] sponsored a project which was designed to determine characteristics of vocational education programs identified as being "most successful."

The study was designed against a background which included rapid expansion of the number of vocational education programs offered by California community colleges, the number of such programs having tripled in the preceding decade, a willingness of the associated community colleges to cooperate in a study which would involve them all, and a desire to undertake a study which would provide information on a difficult administrative problem. Except for a few licensed programs the expansion of programs had been uncoordinated. The expansion was a reflection of the genuine local base of the community college, and a desire to change the junior college image by becoming more comprehensive during this period.

1. Dean of Instruction, Associate Dean of Instruction, or Dean of Guidance and Admissions
2. Member of College Board of Trustees or Member of the Vocational Advisory Committee
3. Vocational Counselor
4. Academic Counselor
5. Instructor in Transfer Curriculum
6. Instructor in Vocational Curriculum
7. Classified Admissions Office Personnel
8. Two Students Enrolled in Vocational Programs
9. Two Students Enrolled in Transfer Programs

On campuses where the organizational structure of the college did not permit identification and selection of these academic types, or where a designated type was unavailable for whatever reason, analogous types were chosen in order to approximate the ideal panel. Most of the participating colleges were able to meet the panel requirements with little difficulty.

In keeping with the requirement of anonymity, panel members were not informed of the identity of other members. Panel members were never assembled as a group.

Delphi Rounds

Polling of the Delphi panels took place in three phases or rounds. In the first round, members of each panel on each campus were presented with a comprehensive list of vocational education programs offered on their campus. Instructions were kept to a minimum. Members were asked to "use your own judgment as to what constitutes 'success'" and, on this basis, identify up to five programs "which you consider to be 'most successful'." Panel members were asked not to consult with others and to exercise independent judgment. For each program identified as most successful, panel members were asked to briefly state their reasons for their choice. The first round responses were tallied and programs ordered according to the percentage of panel members identifying them

as most successful.

For the second round, a list of programs ordered according to numbers of the panel selecting specific programs together with percentages of panelists choosing each program and the reasons for selection was distributed to members of the same panel. The instructions for this round were to read what other panelists had to say about the selected programs and then make a new judgment. This time the panelists were asked to select three most successful programs rather than five. At the end of round two the results of the two independent panels were compared. Most successful programs were defined as those three programs commonly identified by both panels which also had received the greatest percentage of agreement within each panel. Round two was repeated in the few cases where agreement was low.

In a third round the reasons given for identification of successful programs were rated by panel members in terms of their relative importance to program success. These reasons were combined with opinions obtained through interviews with selected participants and then incorporated in a questionnaire used to collect "hard" data on selected programs. These data were then used to determine whether or not the Delphi technique identified programs which were also different on some set of observable variables.

Standard Interviews

Deans of vocational education from each of the participating colleges attended a planning session where they were asked to contribute statements giving their opinion on what made vocational education programs successful. They were also asked to rate these opinions as to their relative

importance to program success. These opinions were then combined with the reasons for the selection of successful programs gathered from Delphi round three panelists.

Analysis of the contributed and rated reasons for success was done by a group of five judges knowledgeable in vocational education. Statements reflecting effects or outcomes of successful programs were separated from statements judged to be deterministic or causal. For example, the statement "This program is very popular with students on campus" would be judged to be an effect or outcome of a successful program, whereas the statement "Instructors in this program have recent work experience in their specialty" would be judged to be causal. This pool of opinions and reasons served as the basis for constructing items for a questionnaire used to collect data during a structured interview with first-line administrators of the programs identified as most successful and of programs not so identified on each campus. Only items that could be readily answered during a structured interview were used.

Definition of "Other" Vocational Education Programs

"Other" vocational education programs were defined as all programs on the list of local programs from which Delphi panels worked other than the three programs jointly identified as most successful. The administrator responsible for research on each campus was asked to select any three programs which met the definition as "other" programs. Although no standardized procedure was recommended, "other" programs on most campuses were chosen by some randomizing process.

Analysis of Data

Delphi Panel Reliability

Complete data were obtained from two Delphi panels at 16 of 21 colleges which initially agreed to participate. At the five colleges that did not complete the Delphi process, problems were encountered which were beyond the control of the college representative who coordinated the Delphi activity.[4]

For the 16 colleges that completed the procedure, the process of Delphi rounds proceeded in a way that was to be expected by Delphi theory and by previous Delphi experience. Since two Delphi panels were used on each campus it was possible to estimate the reliability of the procedure. Reliability statistics have been reported elsewhere in detail.[5] For the sixteen replications of this study the mean reliability statistic was .52 and the median reliability was .63 . These figures were acceptable ($p < .05$ for 13 out of 16 sets of panels) and gave the investigators and the administrative officers on each campus confidence both in the Delphi method and in the numbers attached to the findings reported below about the characteristics of most successful programs.

The reliability statistics indicate that "most successful" programs, by whatever definition, have a reputation that is sensed or known by the entire spectrum of academic types who have little trouble reaching a consensus when polled under the proper conditions.[6]

Identification of Successful Program Characteristics: Correlates of Program Success

Interview schedules were obtained from first-line administrators for for 72 vocational education programs. These included three identified

most successful and three other programs on each of twelve community college campuses. Completed questionnaires yielded about 100 bits of usable information, 58 of which were analyzed for this paper.[7] The data not used was collected for purposes beyond the scope of this particular study.

The 58 items were all either dichotomous (no = 0, yes = 1) or continuously scored and were correlated with the dichotomous variable of a program having been identified as either "other than most successful" (0) or "most successful" (1). Correlations for twenty items significant at the .10 level or better are presented in Table 1, where it is seen that 12 items generated coefficients with $p < .05$ and 6 items generated coefficients with $p < .01$. It can be concluded that the programs identified by the Delphi process are indeed different from the programs not identified and that the difference spans a variety of program characteristics.

Several salient points which may have meaning for vocational programs in community colleges should be mentioned. Successful programs identified in this study are large programs (Item 1) which are visible on campus (Items 4 - 8) and enroll females in greater proportion to males (Item 2). They are programs which tend to be regulated through state licensing (Item 9), screen applicants (Item 3), and do not offer remedial courses (Item 11). It may be that there is a relationship between screening applicants, licensing, percentage of female students, student visibility,

TABLE 1, Correlations for Selected Items With Identified Success of Program

Item Cluster Description		Item Description (paraphrases)	Correlation Coefficient
Student Items	1.	Number of students in program	.34 ***
	2.	Percent male enrollment	-.35 ***
	3.	Are prospective students interviewed prior to admission in the program?	.28 **
Student Visibility Items	4.	Is the student enrolled in this program recognized as a member of an occupational training group by wearing a uniform?	.44 ****
	5.	Does the student take most of his/her course work at the same general location?	.21 *
	6.	Do students generally eat lunch together with other students in the same program?	.20 *
	7.	Does the student have several classes where he works closely together with the same students in a lab or work experience situation?	.21 *
	8.	Does the student belong to a club with other students training for this occupation?	.25 **
Course Items	9.	Does this program have a state licensing or certification procedure?	.45 ****
	10.	Are off-campus facilities regularly used for training of students in this specialty?	.22 *
	11.	Are specific remedial provisions available to entering students?	-.20 *
Instructor Items	12.	Number of instructors in program.	.36 ***
	13.	Number of instructors with full-time field experience in the last two years.	.33 ***
	14.	Number of instructors with recent summer field experience.	.20 *
Instructor Supervision Items	15.	Are classroom visitations made regularly by supervisory personnel?	.21 *
	16.	Are tenured teachers visited?	.21 *
	17.	Are non-tenured teachers visited?	.26 **
Advisory Committee Items	18.	Did the advisory committee for this course meet during the last school year?	.22 **
	19.	Number of members on the advisory committee for this occupation.	.27 **
	20.	Number of advisory committee members currently employed in or are supervisors of personnel in this occupational specialization.	.24 **

*p < .10 ** p < .05 *** p < .01 **** p < .001

curriculum, faculty, supervision, and advisory committee. The range of item constructs that correlate with program success was further suggested by stepwise multiple regression on the 20 items. While the regression analysis was based on a smaller number of cases than is technically desirable, it is reported as a part of this study because it tentatively reinforces the idea that knowledgable observers can identify programs which differ on easily observable characteristics, a finding which is to be expected from both Delphi theory and the findings of other researchers.

Relative Contributions of Program Characteristics to Program Success

The above section discussed the association of a subset of program characteristics with program success. In this section the predictive ability of identified characteristic items will be examined through a regression model in order to identify the relative contribution of each selected item to program success. Within the limits of the regression model and available data this will permit an ordering of the entire set of variables according to their contribution to the variance associated with program success.

In this analysis the 20 items with the highest correlation coefficients (Table 1) were entered into a multiple regression equation in a stepwise manner in an attempt to predict the dependent variable "success." The variables were entered one at a time into the equation on the basis of their contribution to the partial correlation of the combined variables. Contributions to the partial correlation coefficient were tested at each step and variables were either permitted to remain in the

equation or rejected.

The results of this stepwise multiple regression analysis are given in Table 2. It should be noted that the item "Non-tenured faculty visits" was the only item which did not qualify for inclusion in the analysis. For these data, the analysis generated an $F = 4,04$ ($df = 19,52$) which can be used to test the hypothesis that the 19 independent variables exercise no influence on the dependent variable. The calculated F value is significant at $p < .001$. This is of course not startling, since we have already determined that each variable examined independently has the ability to differentiate successful from other programs. Taken collectively, we would expect the 19 variables to reinforce each other.

Table 2 also gives the multiple correlation coefficient R which indicates the extent to which all the 19 items considered together account for variance in the dependent variable, here success. The square of R represents the proportion of variance in the dependent variable accounted for by the 19 independent variables as each of the variables are entered into the regression equation. The multiple R and multiple R^2 statistics indicate that seven of the 19 independent variables account for about 53 percent of the variance in "success." The column labeled "increase in R^2" shows the cumulative contribution of each item to the variance in this regression. After the first seven items are entered into the stepwise regression additional items contribute less than one percent to the explained variance.

Table 2. Summary table for stepwise regression for twenty items.

Step Number	Item Number *	Item Acronym	Multiple R	R^2	Increase in R^2
1	11	Students wear uniforms	.46	.21	.208
2	1	License required	.56	.31	.102
3	10	Number of students	.61	.37	.063
4	7	Classroom visits by supervisors	.66	.43	.059
5	14	Students work together	.69	.48	.049
6	4	Instructors with experience in last 2 years	.71	.51	.029
7	18	Advisory committee met recently	.73	.53	.020
8	6	Off-campus classes	.73	.54	.010
9	2	Male ratio	.74	.55	.010
10	8	Visits to tenured faculty classrooms	.75	.56	.010
11	12	Closeness of students during instruction	.75	.57	.008
12	15	Students occupational clubs	.76	.57	.008
13	3	Number of instructors	.76	.58	.005
14	5	Instructors with recent summer experience	.76	.58	.005
15	13	Students eat lunch together	.78	.59	.003
16	16	Pre-admissions interview	.77	.59	.002
17	17	Remedial coursework	.77	.59	.002
18	19	Number of advisory committee members	.77	.59	.001
19	20	Advisory committee members employed	.77	.60	.001

* Item 9 "Non-tenured faculty visits" was not entered into the step-wise procedure because it did not meet the minimal requirements set by the (BMD) computer program.

We have arbitrarily drawn a line at the 53 percent point to separate the contributors of relatively large amounts of variance in success from the contributors of small amounts of variance. It should be noted that whereas the first seven items account for 53 percent of the variance, the last 12 items account for only seven percent additional variance.

The seven items which account for most of the variance are drawn from all of the topical areas into which the original twenty items were grouped in Table 1. Within the limits of the questionnaire, while not exhaustive, these groups cover the major areas of activity associated with community colleges: The student, the curriculum, the faculty, administration, and trusteeship. Clearly, programs identified as most successful and programs not so identified can best be predicted by the first seven items in Table 2 with diminishing and almost negligible contributions made to prediction of explained variance by the remaining twelve items.

Through this technique more than 50 percent of the variance in successful programs can be accounted for with just seven items. This is a useful amount of variance to account for in an exploratory study and compares favorably with variance accounted for in behavioral science studies in general. It tells us which of the large number of items we began with are the best predictors of success. Our chances of increasing our ability to predict, and thus to identify the key parameters of successful programs, will be enhanced if we continue to study how success in vocational education programs is contingent upon the concepts embodied in these contstructs.

Discussion

This study identified the multivariate nature of success in vocational education programs. Twenty items with potential for predicting program success were identified. Of particular interest is the fact that 20 variables associated with success distribute themselves among five major topical groups: Student; curriculum; faculty; management; and "trusteeship". Of these 20 variables, seven were identified as contributing more than half of the explained variance. In addition, it was seen that these seven items were distributed among the five topical groupings in a way that suggests that they are representative of a broad spectrum of easily identifiable activity associated with program success in community colleges. The representativeness of the 20 varaibles which differentiate identified most successful from other programs and the salience of the seven variables identified with the larger part of the variance associated with program success attest to the multivariate nature of perceived program success and suggest useful avenues of approach to the study of program success in the future.

The process of forming value judgments about programs through Delphi panels and later statistically validating these judgments through the use of program profiles based on hard data is seen as a useful procedure for evaluating programs in situations where objective criteria are not available or cannot be openly agreed upon. Further application of the Delphi technique in program evaluation is limited only by administrative imagination.

Footnotes

1) The Northern California Research Group is an informal association of some 30 community colleges. Its purpose is to encourage cooperative research and to exchange information on research projects and innovative programs. Mr. Walter Brooks of Shasta College served as chairman of the Group and greatly influenced the conceptualization, design, and data collection which resulted in this study.

2) This research was sponsored in part by a grant from the Vocational Education Section of the California State Department of Education, Project Number (Rev.) 69443-C065-71.

3) A general description of the Delphi process can be found in N. Dalkey, et al., Studies in the quality of life: Delphi and decision making, Lexington, Mass.: D.C. Heath & Co., 1972.

4) Data collected during the Delphi phase of this study can be found reported in detail in F. Dagenais, "The Delphi method and the identification of successful programs and their characteristics," a paper presented at the meeting of the California Society of Educational Program Auditors and Evaluators, San Diego, 1975.

5) Results of the reliability aspect of the Delphi panel procedure can be found in F. Dagenais, "The reliability and convergence of the Delphi technique," Journal of General Psychology, forthcoming.

6) Similar conclusions regarding informal group consensus were reached by R.J. Wherry, and D.H. Fryer, "Buddy ratings: Popularity contest or

leadership criteria?," Sociometry 12 (1949): 179-190, and J.K. Hemphill, "Leadership behavior associated with the administrative reputation of college departments," Journal of Educational Psychology 46 (1955): 385-401.

7) A copy of the questionnaire is available upon request from the author.

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